

```
#include <arpa/inet.h>
#include <netdb.h>
#include <netinet/in.h>
#include <stdint.h>
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <ifaddrs.h>
#include <unistd.h>

#include "net.h"
#include "transport.h"
#include "esp.h"

#define DEBUG

uint16_t cal_ipv4_cksm(struct iphdr* iphdr)
{
    // [TODO]: Finish IP checksum calculation
    iphdr->check = 0;
    unsigned short *addr = (unsigned short *)iphdr;
    unsigned int count = iphdr->ihl<<2;
    register unsigned long sum = 0;
    while ( count > 1)
    {
        sum += *addr++;
        count -= 2;
    }
    if (count > 0)
    {
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    sum += ((*addr)&htons(0xFF00));
}
while ( sum >> 16)
{
    sum = (sum & 0xffff) + (sum >> 16);
}
sum = ~sum;
iphdr->check = (uint16_t)sum;
return ((uint16_t)sum);
}

uint8_t *dissect_ip(Net *self, uint8_t *pkt, size_t pkt_len)
{
    // [TODO]: Collect information from pkt.
    // Return payload of network layer
    struct sockaddr_in source,dest;
    struct iphdr *ip = (struct iphdr *)pkt;
    memcpy(&self->ip4hdr, ip, sizeof(struct iphdr));
    // set hdrlen
    self->hdrlen = (size_t)ip->ihl<<2;
    // set plen
    self->plen = pkt_len - self->hdrlen;
    // set pro
    switch (ip->protocol)
    {
        case ESP:
            self->pro = ESP;
            break;
        case IPv4:
            self->pro = IPv4;

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        break;

    case TCP:
        self->pro = TCP;
        break;

    default:
        self->pro = UNKN_PROTO;
        break;
    }

memset(&source, 0, sizeof(source));
source.sin_addr.s_addr = ip->saddr;
memset(&dest, 0, sizeof(dest));
dest.sin_addr.s_addr = ip->daddr;
// set sorce & dest IP

strcpy(self->src_ip,inet_ntoa(source.sin_addr));
strcpy(self->dst_ip,inet_ntoa(dest.sin_addr));

#ifdef DEBUG
printf("\nIP Header\n");
printf("\t|-Version : %d\n", (unsigned int)ip->version);
printf("\t|-Internet Header Length : %d WORDS or %d Bytes\n", (unsigned int)ip->ihl, ((unsigned int)(ip->ihl))*4);
printf("\t|-Type Of Service : %d\n", (unsigned int)ip->tos);
printf("\t|-Total Length : %d Bytes\n", ntohs(ip->tot_len));
printf("\t|-Identification : %d\n", ntohs(ip->id));
printf("\t| -Time To Live : %d\n", (unsigned int)ip->ttl);
printf("\t| -Protocol : %d\n", (unsigned int)ip->protocol);
printf("\t| -Header Checksum : %d\n", ntohs(ip->check));
printf("\t| -Source IP : %s\n", inet_ntoa(source.sin_addr));
printf("\t| -Destination IP : %s\n", inet_ntoa(dest.sin_addr));

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printf("!my checksum: %d\n", ntohs(cal_ipv4_cksm(ip)));
printf("IP pkt srcIP: %s\n", self->src_ip);
printf("IP pkt dstIP: %s\n", self->dst_ip);
printf("IP pkt protocol: %d\n", self->pro);
printf("self->ip4hdr.Protocol: %d\n", (unsigned int)self->ip4hdr.protocol);
#endif

return pkt + self->hdrlen;
}

```

```

Net *fmt_net_rep(Net *self)
{
    // [TODO]: Fill up self->ip4hdr (prepare to send)

    // struct iphdr
    // {
    // #if __BYTE_ORDER == __LITTLE_ENDIAN
    //     unsigned int ihl:4;
    //     unsigned int version:4;
    // #elif __BYTE_ORDER == __BIG_ENDIAN
    //     unsigned int version:4;
    //     unsigned int ihl:4;
    // #else
    // # error "Please fix <bits/endian.h>"
    // #endif
    //     uint8_t tos;
    //     uint16_t tot_len;
    //     uint16_t id;
    //     uint16_t frag_off;
    //     uint8_t ttl;
}

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//    uint8_t protocol;
//    uint16_t check;
//    uint32_t saddr;
//    uint32_t daddr;
//    /*The options start here. */
//};

return self;
}

void init_net(Net *self)
{
if (!self) {
    fprintf(stderr, "Invalid arguments of %s.", __func__);
    exit(EXIT_FAILURE);
}

self->src_ip = (char *)malloc(INET_ADDRSTRLEN * sizeof(char));
self->dst_ip = (char *)malloc(INET_ADDRSTRLEN * sizeof(char));
self->x_src_ip = (char *)malloc(INET_ADDRSTRLEN * sizeof(char));
self->x_dst_ip = (char *)malloc(INET_ADDRSTRLEN * sizeof(char));
self->hdrlen = sizeof(struct iphdr);

self->dissect = dissect_ip;
self->fmt_rep = fmt_net_rep;
}

```

	/*
	* CIS 0000
	* CIS 00000000 1000 CIS 00 2000 CIS 00 3000 CIS 00/00 400000000000 50CIS 00000000

	/*
	* CIS 1 * CIS 2 CIS 3 * CIS 4 * CIS 5 CIS
	*
	* OpenAPI spec version: v1
	*
	*
	* NOTE: This class is auto generated by the swagger code generator program.
	*
	https://github.com/swagger-api/swagger-codegen.git
	* Do not edit the class manually.
	*/
	package com.huawei.cloudcampus.api.model;
	import java.util.Objects;
	import com.google.gson.TypeAdapter;
	import com.google.gson.annotations.JsonAdapter;
	import com.google.gson.annotations.SerializedName;
	import com.google.gson.stream.JsonWriter;

	am.JsonReader;
	import com.google.gson.stre am.JsonWriter;
	import io.swagger.annotation s.ApiModel;
	import io.swagger.annotation s.ApiModelProperty;
	import java.io.IOException;
	import java.util.ArrayList;
	import java.util.List;
	/**
	* InterdictionDTO
	*/
	@javax.annotation.Ge nerated(value = "io.swagger.codegen.l anguages.JavaSdnClien tCodegen", date = "2019-12- 17T15:17:59.469+08: 00")
	public class InterdictionDTO {
	@SerializedName("bl ockId")
	private String blockId = null;
	@SerializedName("te nant")
	private String tenant = null;
	@SerializedName("pr oducer")
	private String

	producer = null;
	@SerializedName("dir ection")
	private Integer direction = null;
	@SerializedName("src lps")
	private List<String> srclps = null;
	@SerializedName("ds tlps")
	private List<String> dstlps = null;
	public InterdictionDTO blockId(String blockId) {
	this.blockId = blockId;
	return this;
	}
	/**
	* ID UUID 必填
	* return blockId
	**/
	@ApiModelProperty(r equired = true, value = " ID UUID 必填 ")
	public String getBlockId() {
	return blockId;
	}
	/**
	* ID UUID 必填
	* Param blockId
	**/

	public void setBlockId(String blockId) {
	this.blockId = blockId;
	}
	public InterdictionDTO tenant(String tenant) {
	this.tenant = tenant;
	return this;
	}
	/**
	* ID UUID * return tenant
	**/
	@ApiModelProperty(v alue = "ID UUID")
	public String getTenant() {
	return tenant;
	}
	/**
	* ID UUID * Param tenant
	**/
	public void setTenant(String tenant) {
	this.tenant = tenant;
	}
	public InterdictionDTO producer(String producer) {
	this.producer = producer;

```
        return this;
    }

    /**
     * ȿȿȿȿ
     * return producer
     */
    @ApiModelProperty(value = "ȿȿȿȿ")
    public String getProducer() {
        return producer;
    }

    /**
     * ȿȿȿȿ
     * Param producer
     */
    public void setProducer(String producer) {
        this.producer = producer;
    }

    public InterdictionDTO direction(Integer direction) {
        this.direction = direction;
        return this;
    }

    /**
     * ȿȿȿȿȿȿ0-ȿȿȿ1-ȿȿȿȿ
     * ȿ0ȿȿȿ
     * return direction
     */
    @ApiModelProperty(required = true, value = "ȿȿȿȿȿȿ0-ȿȿȿ1-ȿȿȿȿ")

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	"0")
	public Integer
	getDirection() {
	return direction;
	}
	}
	/**
	* 0-1-0000
	* 0000
	* Param direction
	**/
	public void
	setDirection(Integer
	direction) {
	this.direction =
	direction;
	}
	}
	public
	InterdictionDTO
	srclps(List<String>
	srclps) {
	this.srclps = srclps;
	return this;
	}
	}
	public
	InterdictionDTO
	addSrclpsItem(String
	srclpsItem) {
	if (this.srclps == null)
	{
	this.srclps = new
	ArrayList<String>();
	}
	this.srclps.add(srclpsItem);
	return this;
	}
	}
	/**
	* IP 0000000000000000

	<pre> * IPV4 IPV6 8 * IP IP IP IP 8 * IP IP IP IP 8 * return srcIps */ @ApiModelProperty(v alue = "IP 8 IPV4 IPV6 8 IP IP IP IP 8 IP IP IP IP 8") public List<String> getSrcIps() { return srcIps; } */ * IP 8 IPV4 IPV6 8 IP IP IP IP 8 * Param srcIps */ public void setSrcIps(List<String > srcIps) { this.srcIps = srcIps; } */ public InterdictionDTO dstIps(List<String> dstIps) { this.dstIps = dstIps; return this; } */ public InterdictionDTO addDstIpsItem(String dstIpsItem) { if (this.dstIps == null) { </pre>
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```
        this.dstIps = new
        ArrayList<String>();
    }
    this.dstIps.add(dstIpSl
    tem);
    return this;
}

/**
 * 用于IP 地址的处理
 * IPV4|IPV6 地址
 * 1 用于IP|IP 地址
 * IP 地址
 * return dstIps
 */
@ApiModelProperty(v
alue = "用于IP 地址的处理
* IPV4|IPV6 地址
* 1 用于IP|IP 地址
* IP 地址")
public List<String>
getDstIps() {
    return dstIps;
}

/**
 * 用于IP 地址的处理
 * IPV4|IPV6 地址
 * 1 用于IP|IP 地址
 * IP 地址
 * Param dstIps
 */
public void
setDstIps(List<String
> dstIps) {
    this.dstIps = dstIps;
}

@Override
public boolean
equals(java.lang.Obje
```

	ct o) {
	if (this == o) {
	return true;
	}
	if (o == null
	getClass() !=
	o.getClass()) {
	return false;
	}
	InterdictionDTO
	interdictionDTO =
	(InterdictionDTO) o;
	return
	Objects.equals(this.bl
	ockId,
	interdictionDTO.blockI
	d) &&
	Objects.equals(this.te
	nant,
	interdictionDTO.tenan
	t) &&
	Objects.equals(this.pr
	ducer,
	interdictionDTO.produ
	cer) &&
	Objects.equals(this.di
	rection,
	interdictionDTO.direct
	ion) &&
	Objects.equals(this.sr
	clps,
	interdictionDTO.srcIps
) &&
	Objects.equals(this.ds
	tlps,
	interdictionDTO.dstIps
);
	}
	@Override
	public int hashCode()
	{

	<pre> return Objects.hash(blockId, tenant, producer, direction, srclps, dstlps); } </pre>
	<pre> @Override public String toString() { </pre>
	<pre> StringBuilder sb = new StringBuilder(); </pre>
	<pre> sb.append("class InterdictionDTO {\n"); </pre>
	<pre> sb.append(" blockId: ").append(toIndented String(blockId)).appen d("\n"); </pre>
	<pre> sb.append(" tenant: ").append(toIndented String(tenant)).appen d("\n"); </pre>
	<pre> sb.append(" producer: ").append(toIndented String(producer)).app end("\n"); </pre>
	<pre> sb.append(" direction: ").append(toIndented String(direction)).app end("\n"); </pre>
	<pre> sb.append(" srclps: ").append(toIndented String(srclps)).append ("\n"); </pre>
	<pre> sb.append(" dstlps: ").append(toIndented String(dstlps)).appen d("\n"); </pre>
	<pre> sb.append("}"); </pre>

	return sb.toString();
	}
	/**
	* Convert the given object to string with each line indented by 4 spaces
	* (except the first line).
	*/
	private String toIndentedString(java .lang.Object o) {
	if (o == null) {
	return "null";
	}
	return o.toString().replace("\n", "\n ");
	}
	}

Footer

	*
	* OpenAPI spec version: v1
	*
	*
	* NOTE: This class is auto generated by the swagger code generator program.
	* https://github.com/swagger-api/swagger-codegen.git
	* Do not edit the class manually.
	*/
	package com.huawei.cloudcampus.api.model;
	import java.util.Objects;

	import com.google.gson.TypeAdapter;
	import com.google.gson.annotations.JsonAdapter;
	import com.google.gson.annotations.SerializedName;
	import com.google.gson.stream.JsonReader;
	import com.google.gson.stream.JsonWriter;
	import io.swagger.annotations.ApiModel;
	import io.swagger.annotations.ApiModelProperty;
	import java.io.IOException;
	import java.util.ArrayList;
	import java.util.List;
	/**
	* InterdictionDTO
	*/
	@javax.annotation.Generated(value =
	"io.swagger.codegen.languages.JavaSdnClientCo
	degen", date = "2019-12-
	17T15:17:59.469+08:00")
	public class InterdictionDTO {
	@SerializedName("blockId")
	private String blockId = null;
	@SerializedName("tenant")
	private String tenant = null;
	@SerializedName("producer")
	private String producer = null;
	@SerializedName("direction")
	private Integer direction = null;
	@SerializedName("srclps")
	private List<String> srclps = null;
	@SerializedName("dstlps")
	private List<String> dstlps = null;
	public InterdictionDTO blockId(String blockId) {
	this.blockId = blockId;

	return this;
	}
	/**
	* ID UUID
	* return blockId
	**/
	@ApiModelProperty(required = true, value = "ID UUID")
	public String getBlockId() {
	return blockId;
	}
	/**
	* ID UUID
	* Param blockId
	**/
	public void setBlockId(String blockId) {
	this.blockId = blockId;
	}
	public InterdictionDTO tenant(String tenant) {
	this.tenant = tenant;
	return this;
	}
	/**
	* ID UUID
	* return tenant
	**/
	@ApiModelProperty(value = "ID UUID")
	public String getTenant() {
	return tenant;
	}
	/**
	* ID UUID
	* Param tenant
	**/
	public void setTenant(String tenant) {
	this.tenant = tenant;

	}
	public InterdictionDTO producer(String producer)
	{
	this.producer = producer;
	return this;
	}
	/**
	*
	* return producer
	**/
	@ApiModelProperty(value = " ")
	public String getProducer() {
	return producer;
	}
	/**
	*
	* Param producer
	**/
	public void setProducer(String producer) {
	this.producer = producer;
	}
	public InterdictionDTO direction(Integer
	direction) {
	this.direction = direction;
	return this;
	}
	/**
	*
	* return direction
	**/
	@ApiModelProperty(required = true, value = " ")
	public Integer getDirection() {
	return direction;
	}
	/**

	<pre>* 00000000-0000-0000-0000-000000000000 * Param direction */ public void setDirection(Integer direction) { this.direction = direction; }</pre>
	<pre>public InterdictionDTO srcIps(List<String> srcIps) { this.srcIps = srcIps; return this; }</pre>
	<pre>public InterdictionDTO addSrcIpsItem(String srcIpsItem) { if (this.srcIps == null) { this.srcIps = new ArrayList<String>(); } this.srcIps.add(srcIpsItem); return this; }</pre>
	<pre>/* * 0 IP 0000000000000000 IPV4 IPV6 0000 8 0 IP00 IP 000000 IP 0000000000 * return srcIps */ </pre>
	<pre>@ApiModelProperty(value = "0 IP 0000000000000000 000 IPV4 IPV6 0000 8 0 IP00 IP 000000 IP 00000000 00") public List<String> getSrcIps() { return srcIps; }</pre>
	<pre>/* * 0 IP 0000000000000000 IPV4 IPV6 0000 8 0 IP00 IP 000000 IP 0000000000 * Param srcIps */ public void setSrcIps(List<String> srcIps) { this.srcIps = srcIps; }</pre>

	<pre>public InterdictionDTO dstIps(List<String> dstIps) { this.dstIps = dstIps; return this; }</pre>
	<pre>public InterdictionDTO addDstIpsItem(String dstIpsItem) { if (this.dstIps == null) { this.dstIps = new ArrayList<String>(); } this.dstIps.add(dstIpsItem); return this; }</pre>
	<pre>/* * 用于IP 地址的列表，支持 IPV4 IPV6 地址的 1 个或多个 IP 地址 * return dstIps */</pre>
	<pre>@ApiModelProperty(value = "用于IP 地址的列表，支持 IPV4 IPV6 地址的 1 个或多个 IP 地址")</pre>
	<pre>public List<String> getDstIps() { return dstIps; }</pre>
	<pre>/* * 用于IP 地址的列表，支持 IPV4 IPV6 地址的 1 个或多个 IP 地址 * Param dstIps */</pre>
	<pre>public void setDstIps(List<String> dstIps) { this.dstIps = dstIps; }</pre>
	<pre>@Override</pre>
	<pre>public boolean equals(java.lang.Object o) { if (this == o) { return true;</pre>

	<pre> } if (o == null getClass() != o.getClass()) { return false; } InterdictionDTO interdictionDTO = (InterdictionDTO) o; return Objects.equals(this.blockId, interdictionDTO.blockId) && Objects.equals(this.tenant, interdictionDTO.tenant) && Objects.equals(this.producer, interdictionDTO.producer) && Objects.equals(this.direction, interdictionDTO.direction) && Objects.equals(this.srclps, interdictionDTO.srclps) && Objects.equals(this.dstlps, interdictionDTO.dstlps); } @Override public int hashCode() { return Objects.hash(blockId, tenant, producer, direction, srclps, dstlps); } @Override public String toString() { StringBuilder sb = new StringBuilder(); sb.append("class InterdictionDTO {\n"); } sb.append(" blockId: ").append(toIndentedString(blockId)).append("\n"); sb.append(" tenant: ").append(toIndentedString(tenant)).append("\n"); sb.append(" producer: ").append(toIndentedString(producer)).append("\n"); sb.append(" direction: </pre>
	sb.append(" direction: ").append(toIndentedString(direction)).append("\n"); }

	".append(toIndentedString(direction)).append("\n");
	sb.append(" srclps: ").append(toIndentedString(srclps)).append("\n");
	sb.append(" dstlps: ").append(toIndentedString(dstlps)).append("\n");
	sb.append("}");
	return sb.toString();
	}
	/*
	* Convert the given object to string with each line indented by 4 spaces
	* (except the first line).
	*/
	private String toIndentedString(java.lang.Object o) {
	if (o == null) {
	return "null";
	}
	return o.toString().replace("\n", "\n ");
	}
	}

Footer